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Kinetic considerations of two *Sulfurospirillum* spp. competing for tetrachloroethene

Géraldine Buttet¹, Alexandra Murray², Mélissa Burion¹, Christof Holliger¹ & Julien Maillard¹

¹ Laboratory for Environmental Biotechnology, ENAC-IIE-LBE, Ecole Polytechnique Fédérale de Lausanne (EPFL), Lausanne, Switzerland

² DTU Environment, Department of Environmental Engineering, Technical University of Denmark, Lyngby, Denmark

A well-established bacterial consortium that dechlorinates tetrachloroethene (PCE) to tri- (TCE) and *cis*-dichloroethene (*cis*-DCE) in a stepwise manner has been shown to harbor two distinct populations of *Sulfurospirillum* spp. [1]. A genotyping method has been developed to distinguish both populations on the basis of small differences in the sequence of their respective reductive dehalogenase gene (*pceA*) [2]. Individual subcultures of the two *Sulfurospirillum* populations revealed that one of them (strain SL2-1) has a reduced dechlorination potential (PCE to TCE), while the other (SL2-2) is able to dechlorinate PCE to *cis*-DCE.

Recent work on both the individual subcultures and the two in competition allowed investigation of the reasons for the interplay and long-term stability of both *Sulfurospirillum* spp. in the consortium. The kinetic parameters of PCE dechlorination were assessed for both strains by varying the PCE concentration and following growth based on chloride release and increase of the *pceA* gene copy number. Modelling of the data obtained revealed clear differences in affinity for PCE and maximal dechlorination rate of both strains. Moreover, inhibitory effects were observed for both populations at high PCE concentration, though it is unclear whether PCE or the dechlorination products (TCE and *cis*-DCE, respectively) are responsible for this. The succession of both populations in PCE and TCE dechlorination was confirmed by competition experiments at low and high PCE concentrations. We think that the obtained strain-specific kinetic parameters reflect the activity of the respective PceA enzyme, both in terms of dechlorination rate and extent.

References

[1] Maillard *et al.* (2011), *Biodegradation* **22**:949

[2] Buttet *et al.* (2013), *Appl Environ Microbiol* **79**:6941